

“ I took five measures of the polar diameter of *Jupiter*, Feb. 28, with my own-made micrometer = $42''.81$, circumstances very bad. On March 5 I took eight measures of the equatoreal diameter with the Munich micrometer = $44''.64$, circumstances rather better, but bad.”

Mr. Lassell proposes to resume these observations when the weather is favourable.

“ My equatoreal-clock does admirably. All those I know go very differently, with and without a drop of oil, and I do not know that I need say less of my own.”

Mr. Hartnup says, “ I saw the fourth satellite on the face of *Jupiter*, on Feb. 28. It appeared to me only a few shades lighter than the shadow. I looked at the planet, unprepared for the phenomenon, and my first impression was, that I saw the shadows of two satellites. The shadow was very large, and the diameter of it and of the satellite would have admitted of measurement had the atmosphere been favourable. The definition was very bad.”

Proper Motions of 875 Stars of the Greenwich Catalogue of 1439 Stars, deduced by Comparison with the Places derived from Bradley's Observations, as given in the Fundamenta Astronomiæ for the Epoch 1755. By the Rev. R. Main, M.A., of the Royal Observatory.

“ One of the great objects of modern astronomy is to enable us to predict accurately the place of a given fixed star for a given epoch, and this problem the resources derived from the masses of accurate observations that are now systematically made and reduced at the great observatories of Europe enable us to solve for a tolerably large number of stars. If, in star observations at the different observatories, anything like an organised plan of division of labour had been adopted and carried out for a period of some years, we should have at the present time means of determining accurately the places of at least all the stars contained in the three great fundamental catalogues of Bradley, Piazzzi, and Groombridge, and consequently every facility for determining the proper motions of all the stars contained in those catalogues. In the instance of the last-mentioned catalogue, viz. that of Groombridge, we shall soon, through the well-directed labours of Mr. Johnson, be thus situated. He has, with an energy deserving the highest praise, very nearly completed the reobservation of all Groombridge's stars, and the formation of the catalogue containing the resulting places will form a new epoch in the sidereal astronomy of the northern heavens. But in general no systematic reobservation of the other great catalogues has been attempted, and the proper motions of stars must be deduced from the results that are found scattered in the obser-

vations, or the catalogues resulting from the observations, of the different modern observatories.

“ Since the epoch of Piazzî's catalogue the most important general catalogues have emanated from Greenwich :—

“ I mean, first, Pond's Greenwich catalogue of 1112 stars whose epoch is 1830.

“ Secondly, Airy's Greenwich catalogue of 1439 stars whose epoch is 1840 ; which contains the results of all the Greenwich observations of stars from 1836 to 1841 inclusive.

“ Thirdly, Airy's Greenwich catalogue of 2156 stars, which includes the results of the former catalogue (the second named), and gives additionally for the epoch 1845 the results of all the observations of stars from 1842 to 1847 inclusive.

“ During the greater part of the time during which I have been engaged on the present work the last-named catalogue was not published, but I have been enabled to make use of the places given in it for completing all such results as in the second catalogue were given in only one element. The proper motions are, therefore, generally completely given in both elements, except in a few cases where there are no corresponding observations in the *Fundamenta*, or where the catalogue of 2156 stars does not contain a corresponding observation to that of Bradley.

“ A glance at the Introduction of the volumes of the *Greenwich Observations* will enable us to see that the importance of the stars thus compared is much greater than their numbers would seem to warrant ; for, in the first place, all the fundamental stars contained in the list of the *Nautical Almanac* have been observed with such frequency and accuracy as to render the calculation of their places an object of very great importance. In the next place, nearly all the conspicuous stars that fall in the path of the moon during a whole revolution of the node have been observed with sufficient frequency to give accurate places, so that the places given in the Greenwich catalogue, combined with the proper motions deduced by comparison with Bradley, will enable us to predict their places for nearly a century to come with amply sufficient accuracy for all the purposes of lunar astronomy. Lastly, a great many stars within the zodiacal limits have been observed for general purposes, and many that pass very near to the zenith of Greenwich, and are therefore useful for redetermination of the constants of refraction, and for geodetical purposes. In fact, few of the stars in the Greenwich catalogue have been observed without some special object that renders the determination of their places valuable. I have been induced, by the above reasons, to select the catalogue of 1439 stars for comparison with Bradley ; and I hope to be able to add, from time to time, the results of the comparison of all those remaining in the catalogue of 2156 stars, and of others which may be given in future Greenwich catalogues.”

Mr. Main then enters into the intricate subject of precession, and briefly explains the methods adopted by Bessel, Otto Struve, and Peters, in determining the values of the constants m and n for

every ten years between 1750 and 1850. The annual precession for each star is,

In R.A. = $m + n \cdot \sin \alpha \cdot \tan \delta$: In Dec. = $n \cdot \cos \alpha$.

“The table from which the precessions used in this paper have been computed is as follows :—

Year.	Annual General Precession.	m .	n .	Log. n .
1750	50.2298	46.0481	20.0650	1.302439
1760	2320	0509	0642	302421
1770	2343	0538	0633	302402
1780	2366	0566	0624	302383
1790	2388	0595	0616	302365
1800	2411	0623	0607	302346
1810	2434	0651	0598	302327
1820	2456	0680	0590	302309
1830	2479	0708	0581	302290
1840	2502	0737	0572	302271
1850	50.2524	46.0765	20.0564	1.302253

In computing the whole precessional motion, Mr. Main has adopted the formula pointed out by M. Otto Struve, viz. :—

“If p_1, p_2, p_3 , be the annual precessions in R.A. or N.P.D. for a star, not very near the pole, at equidistant epochs t_1, t_2, t_3 , and if the whole interval from t_1 to t_3 be T,

Then the whole precessional motion = $\frac{1}{6} (p_1 + 4 p_2 + p_3) \times T$,
or the mean annual precession = $\frac{1}{6} (p_1 + 4 p_2 + p_3)$,

which is generally sufficient. If four or five equidistant precessions be similarly computed,

Mean precession = $\frac{1}{8} (p_1 + 3 p_2 + 3 p_3 + p_4)$, or
= $\frac{1}{50} (7 p_1 + 32 p_2 + 12 p_3 + 32 p_4 + 7 p_5)$

respectively.”

Mr. Main then shows how, by taking advantage of the nearness of his epochs to equidistance, he has been enabled to avail himself of Bessel’s precessions for 1755 and 1800, after applying certain corrections which he has tabulated under a very convenient form :—

“For a few stars near the pole the whole precessional motion was computed rigorously by Bessel’s method, given in the *Fundamenta* and the *Tabulæ Regiomontanæ*, by means of the numbers given by Mr. Baily in the Introduction to the *Catalogue of the British Association*. Suitable corrections were applied to reduce the resulting mean annual precession to that which would have been obtained by using Peters’ constants.”

The results of Mr. Main’s investigations are arranged in three catalogues.

First, a list of 875 stars, with the proper nomenclature and the

numbers of the *Fundamenta* affixed, of which the proper motion has been determined by a comparison between the *Fundamenta* and the *Greenwich Catalogue of 1439 Stars*, using Peters' precession. There are four columns to each element, which are respectively the correction to Bessel's precession, the mean precessional motion according to O. Struve's and Peters' determination, the mean annual motion as deduced from a comparison of the two catalogues, and, lastly, the proper motion or difference between the two preceding columns.

Secondly, a catalogue of stars selected from the previous catalogue, which have proper motions greater than $0^s.005$ in R.A. or $0''.1$ in N.P.D. To this catalogue, which contains nearly 370 stars, the approximate R.A. and N.P.D. of the stars are added, as well as Argelander's magnitudes and the number of observations.

Thirdly, a catalogue of those stars in the first list which have proper motions exceeding $0^s.02$ in R.A. and at least $0''.3$ in N.P.D. These are 85 in number, including double stars: and Mr. Main has appended two new columns, containing the factors of the effect of solar motion upon each star in R.A. and N.P.D., supposing the motion to be $= 1$, and directed to a point in the heavens which is in R.A. 260° and N.P.D. $55^\circ 37'$. Mr. Main considers this motion, first pointed out by Sir W. Herschel and since established by the investigations of Argelander, O. Struve, and Galloway, to be quite certain, and that the direction is pretty well fixed. The quantity of the solar motion, as detected by O. Struve, is less certain, but yet a fair approximation, which may perhaps be improved by taking the results of the present memoir into consideration.

The errors introduced into the catalogue of the *Fundamenta* by Lindenau's value of the constant of nutation, now generally considered erroneous, cannot be *completely* eliminated, except by reducing the observations anew, or by a careful rectification of Bessel's MSS. computations.

"With regard to double stars I have been guided by their closeness and the probable nature of Bradley's observations. If one star of a tolerably close double star is considerably brighter than the other, I have compared Bradley's observation with the Greenwich observation of the larger star. If the stars be close and tolerably equal in magnitude, I have compared Bradley's observations with the mean of the Greenwich observations for both stars, if both have been observed. I have, in every case, given due attention to the nature of the observations.

"I hope the results of this comparison of the Greenwich catalogue with that of Bradley, by means of the best known modern data, will be acceptable to astronomers, at least as a basis for future operations. Before we can hope to improve greatly our present sidereal knowledge, it will be necessary that this labour be undertaken for all the stars of the catalogues of Bradley and Piazzi; and, for this purpose especially, that pains be taken in our principal observatories that such stars in those catalogues as have

not been recently observed should be so as speedily as possible, and with sufficient frequency to give places of indisputable accuracy.

"In the mean time the recently published Greenwich twelve years' catalogue will still further assist our inquiries; and I hope, at no distant time, to be able to offer to the Society the result of the comparison of all the stars common to it and the *Fundamenta* which are not already included in the present memoir."

Extract of a Letter from Mr. J. Curley, of Georgetown College, Washington.

"On the 28th November last, the Rev. T. M. Jenkins, a member of this College (to whose liberality we are indebted for our observatory), when on his passage to Rio Janeiro, saw a comet, of which the following is a description.

"On the 28th of November, at $7^{\text{h}}\frac{1}{4}$ p.m." (being then in about 10° S. latitude, and 30° W. longitude), "we saw a comet to the westward, nearly in the track of the sun, about 14° above the horizon, as measured with the quadrant. The nucleus very distinct, about as large in appearance as *Mars*, the tail curved and pointing towards the south (SW.), quite bright and nearly a degree in length as seen by the naked eye, but much larger when viewed with the glass. It was seen by all the crew for about twenty minutes, when a cloud obscured it and it was seen no more."

Mr. Curley suggests the probable identity of this comet with the great comet of 1556, to which Mr. Hind has drawn attention. Mr. Hind remarks on Mr. Curley's letter,—"*I think it is quite possible* that the comet seen by the Rev. T. Jenkins on November 28, 1849, may have been the great one expected about that time. My own opinion, however, though I must admit the possibility of the identity, is, that the object observed was not the expected comet. If we are to understand by 'the track of the sun,' the *same parallel of declination*, the right ascension of the comet would have been about $18^{\text{h}}30^{\text{m}}$, giving the time of perihelion passage, with my elements, about Nov. 13, 1849, but on this supposition the comet's declination would be rather less than that of the sun, which seems to be contradicted by the direction of the tail. Again, if we suppose the two comets identical, and perihelion passage November 13, it is not very easy to account for its not having been observed after the 28th of that month, since it would be receding from the sun's place, though at the same time going away from us.

"I do not think it is practicable to observe the comet now, if it were in perihelion between November 10 and 20, 1849. I find, if we fix the perihelion passage on November 10, the comet's position, April 1, will be about,

Right Ascension, $2^{\text{h}}21^{\text{m}}.3$. North Polar Distance, $92^{\circ}39'$.

Distance from earth, 3.40

„ sun, 2.56